

## Claims

- [c1] 1. A flexible belt seam treatment apparatus comprising:  
a support element with a smooth surface arranged to support a belt seam region;  
a heat source comprising an infrared radiation source in optical communication with optics that form a heat spot across at least a portion of a treatment strip and at least a portion of a belt seam region on which the treatment strip is placed; and  
a pressure applicator arranged to force at least the portion of the treatment strip against the portion of the belt seam region.
- [c2] 2. The apparatus of claim 1 wherein the smooth surface is adhesive.
- [c3] 3. The apparatus of claim 2 wherein the smooth, adhesive surface comprises a fluoropolymer.
- [c4] 4. The apparatus of claim 1 wherein the pressure applicator comprises a pressure wheel.
- [c5] 5. The apparatus of claim 4 wherein the support element is substantially planar and the pressure wheel has a substantially right cylindrical outer surface.
- [c6] 6. The apparatus of claim 4 wherein the support element is substantially tubular and the pressure wheel has a substantially concave outer surface substantially corresponding to an arcuate section of a cross section of the support element.
- [c7] 7. The apparatus of claim 4 wherein an outer surface of the pressure wheel comprises an adhesive coating.
- [c8] 8. The apparatus of claim 1 wherein the pressure applicator exerts about 1 lb/in to about 20 lb/in line contact force.
- [c9] 9. A flexible belt seam treatment apparatus comprising:  
a support element with a smooth surface arranged to support a belt seam region;  
a heat source arranged to heat at least a portion of a treatment strip to a

temperature falling in a range of from about 20 ° C to about 70 ° C above a glass transition temperature of at least one of a thermoplastic polymer of the treatment strip and a thermoplastic polymer of the belt seam region; and a pressure applicator arranged to force at least the portion of the treatment strip against the portion of the belt seam region.

[c10] 10. The apparatus of claim 9 wherein the heat source is an incandescent lamp.

[c11] 11. The apparatus of claim 9 wherein the heat source is a high intensity discharge lamp.

[c12] 12. The apparatus of claim 9 wherein the heat source is a laser.

[c13] 13. The apparatus of claim 9 further comprising optics arranged to direct infrared radiation from the heat source at the seam region.

[c14] 14. The apparatus of claim 13 wherein the optics direct a line of infrared radiation across the entire treatment strip and seam region.

[c15] 15. The apparatus of claim 13 wherein the optics direct a spot of infrared radiation across a portion of each of the treatment strip and the seam region.

[c16] 16. A belt seam treatment apparatus comprising:  
a tube with a smooth, adhesive outer surface;  
a belt hold system arranged to hold a seam region of a belt against at least a portion of the outer surface of the tube;  
an infrared radiation source in optical communication with the at least a portion of the outer surface of the tube against which the seam region of the belt is held; and  
a pressure wheel with a substantially concave outer surface substantially corresponding to a curvature of the at least a portion of the outer surface of the tube against which the seam region of the belt is held.

[c17] 17. The apparatus of claim 16 wherein the infrared radiation source is an infrared laser.

[c18] 18. The apparatus of claim 17 further comprising optics that alter a polarization

of infrared radiation from the infrared laser and form a heat spot on a portion of the seam region of the belt after a treatment strip has been applied.

[c19] 19. The apparatus of claim 18 further comprising an actuator that adjusts the optics so that the heat spot traverses a width of the seam region.

[c20] 20. The apparatus of claim 19 further comprising another actuator that moves the pressure wheel with the heat spot to compress a portion of the strip and the seam region that the heat spot has heated.

[c21] 21. The apparatus of claim 16 wherein the infrared radiation source is an infrared lamp.

[c22] 22. The apparatus of claim 21 further comprising optics that reflect and focus the infrared radiation from the infrared lamp onto at least a portion of the seam region of the belt after a treatment strip has been applied.

[c23] 23. The apparatus of claim 22 wherein the optics form a heat spot on a portion of the strip and the seam region and further comprising an actuator that adjusts the optics so that the heat spot traverses a width of the seam region.

[c24] 24. The apparatus of claim 23 further comprising another actuator that moves the pressure wheel with the heat spot to compress a portion of the strip and the seam region that the heat spot has heated.

[c25] 25. The apparatus of claim 22 wherein the lamp extends across substantially the entire seam region and the optics form a heat line across the entire seam region.

[c26] 26. The apparatus of claim 16 wherein the belt hold system comprises a vacuum system including at least one opening in the outer surface of the tube, sealed end of the tube, and an unsealed end of the tube in selective fluid communication with a vacuum source.

[c27] 27. The apparatus of claim 16 wherein the belt hold system includes a bar that extends through a portion of the belt farthest from the tube and selectively pulls the belt against the tube.

[c28] 28. The apparatus of claim 27 wherein the bar is connected to an actuator that selectively exerts force on the belt to pull the belt against the tube.

[c29] 29. The apparatus of claim 27 wherein the bar is placed in the belt by an operator and pulls the belt through the action of gravity on the bar.

10063972